arrive at the Cape and to forward to you such of the specimens collected as require only ordinary care in their transmission. The more fragile things are likely to reach you in better condition if I keep them until my return to England, than they would if they were sent with the others.

SCIENTIFIC SERIALS

Journal de Physique théorique et appliquée, Feb. 1875.—This number contains several papers reprinted from other serials, and the following original ones :—On the spectra of yttrium, erbium, didymium, and lanthanum, by Prof. R. Thalèn. On account of the difficulty to obtain the compounds of these metals in a pure state, considerable doubt has hitherto existed, whether certain lines that always appeared in the spectra of yttrium and ertium and in those of didymium and lanthanum belonged to the first or second metal in the pair ; the state of these questions in 1868 was, that there were twelve lines which always appeared when yttrium or erbium were examined, and sixteen lines in the case of didymium and lanthanum. Prof. Thalèn succeeded in obtaining sufficient quantities of compounds of each of the metals, from M. Cleve, Professor of Chemistry at the Upsala University, and these were of undoubted purity. He was thus enabled to study their spectra most accurately, and the following table shows the number of lines found in former and in the recent researches :—

Metal.	Number of lines, 1868.		1873.
Yttrium	70	+ 12 uncertain	106
Erbium	10		83
Didymium	6	+ 16 ,,	209
Lanthanum	49		188

It was found that the twelve uncertain lines that always appeared with yttrium or erbium belong to yttrium only ; in the same way the sixteen uncertain ones in the second case belong only to the lanthanum spectrum. Prof. Thalèn gives a detailed map of the spectra in question.—Researches on the induction sparks and electro-magnets ; their application to electro-chronographs, by M. Marcel Deprez.—On analogies in the evolution of gases from their over-saturated solutions, and the decomposition of certain explosive substances, by M. D. Gernez.—On the preservation of energy in electric currents, by M. E. Bouty.—On the transformation of static into dynamic electricity, by M. E. Bichat.

Der Zoologische Garten.—In the January number, the first article is a description of the new Zoological Gardens at Frankfort, by the director, Dr. Max Schmidt, illustrated by a coloured plan. J. von Fischer gives an account of the habits of *Herpestes galera* as observed in confinement. E. Buck figures and describes an apparatus for producing currents in the water of aquaria ; it may be worked either by a miniature steam-engine or by clockwork. H. Schacht gives minute details of the breeding habits of the common swallow (*Hirundo rustica*) ; and A. B. Meyer and K. von Rosenberg both write upon the newly discovered Bird of Paradise (*Diphyllodus Gulielmi III.*, Van Muschenbroek) from Ternate.—In the February number is printed a paper read by Dr. Hermann Müller before the Provincial Society of Westphalia, on the stingless Brazilian Honey-bees of the genus *Melipona*, and the possibility of their acclimatisation in Europe. Dr. J. J. Rein remarks on the distribution of some of the mammals of Japan ; and C. Geitel writes on the feeding of small birds in winter in the neighbourhood of human habitations.

Poggendorff's Annalen der Physik und Chemie, 1875, No. 2, contain the following papers :—On the galvanic conducting capacity of melted salts, by F. Braun. The author experimented with twelve different salts, and tabulates his results ; the salts were nitrates of potash, soda and silver, carbonates of potash and soda, sulphate of soda, chlorides of potassium, sodium, strontium, zinc and lead, and iodide of potassium.—On a compilation of facts which prove a decrease of volume as a consequence of chemical action in solid bodies, by W. Müller.—On the electric conducting capacity of the chlorides of the alkalies and alkaline earths as well as of nitric acid in aqueous solutions, by F. Kohlrausch and O. Grotrian. This is the last part of the author's interesting communications, and treats of the liquids examined, of the resistances observed, of the conducting capacities in their relation to that of mercury, and of their dependence on temperature ; further, of their proportion to the percentage of concentration of liquids, of the co-efficients of temperature, and of the conducting capacity of dilute solutions.—On the theory of galvanometers, by H. Weber.—A reply to Baron Eötvös' remarks on a part of the astronomical undulation-theory by Ed. Ketteler.—Some remarks upon Helmholtz's work on Sound, "Die Lehre von den Tonempfindungen," by Emil v. Quanten ; these remarks relate principally to what Helmholtz says on vowels.—A reply to Herr C. Heumann regarding his claim of priority in observing the action of nitrate of silver upon sulphide of copper, by R. Schneider.—On the construction of lightning conductors, by Dr. W. A. Nippoldt. Some remarks by Dr. G. Baumgartner, on Prof. E. Edlund's paper on the nature of electricity.—Description of a very simple apparatus to photograph spectra, by Hermann W. Vogel ; this apparatus can even be applied to an ordinary pocket spectroscope of the smallest dimensions.—On the phenomena of interference visible on mirrors covered with dust or a fine layer of grease, by Prof. M. Sekulic.—Researches on apparent adhesion, by J. Stefan.—On the conducting capacity of the halogen compounds of lead, by E. Wiedemann.

Transactions of the Manchester Geological Society, Part viii. vol. xiii., 1874–75.—Nearly the whole of this part is occupied by an elaborate illustrated paper on "Hæmatite Deposits," by Mr. J. D. Kendall. There is a short paper by Mr. A. W. Waters on "Tertiary Coals," in reference to specimens of carbonised peat he found in Northern Italy under rather peculiar circumstances. Part ix. is occupied with the discussion on Mr. Kendall's paper on Hæmatite deposits, and with a long paper on basalt and its effects, by Mr. G. C. Greenwell, F.G.S.

SOCIETIES AND ACADEMIES

London

Royal Society, April 29.—"On a Continuous Self-Registering Thermometer," by H. Harrison Cripps. Communicated by Prof. Stokes, Sec. R.S.

The instrument is divided into two portions :—First, the thermometer, which marks the degrees ; secondly, the clockwork, which indicates the hours and minutes. The thermometer is first described. The form in which it was originally made, and which perhaps serves best for illustrating the principle, was the following :—A glass bulb, rather more than an inch in diameter, ends in a glass tube 12 inches long, having a bore of $\frac{1}{8}$ inch. This tube is coiled round the bulb in such a manner as to form a complete circle four inches in diameter, the bulb being in the centre of this circle. Fixed to opposite poles of the bulb, exactly at right angles to the encircling tube, are two needle-pointed pivots. These pivots work in minute metal depressions fixed to the sides of two parallel uprights. It will be seen from this arrangement that the bulb with its glass tube will rotate freely between the uprights, and the pivots will be the centre of a circle, the circumference of which is formed by the glass tube. The bulb is filled with spirit in such quantity that at 60° Fahrenheit the spirit will fill not only the bulb, but about 4 inches of the tube. Mercury is then passed into the tube till it comes into contact with the spirit, and in such quantity as to fill up about three inches of the remaining portion of the tube. The spirit is now heated to 120°, and as it expands forces the column of mercury in front of it till the mercury comes within $\frac{1}{4}$ inch of the end of the tube. The tube is then hermetically sealed, enclosing a small quantity of air. If the thermometer be now arranged with its needle-points between the uprights, it will be observed that, as the spirit contracts on cooling, it draws the column of mercury with it. This immediately alters the centre of gravity, and the bulb and tube begin to revolve in a direction opposite to that of the receding mercury. On again applying heat, and the mercury passing forwards, the bulb regains its original position. By this simple arrangement, the two forces, heat and gravity, acting in contrary directions, generate a beautifully steady rotatory movement. The method by which this movement is made serviceable for moving the register will now be described. A grooved wheel, two inches in diameter, is fixed to one of the central pivots, therefore revolving with the bulb. Directly above, and at a distance of seven inches from this wheel, is fixed between needle-points another wheel of exactly similar size. Around and between these two wheels passes a minute endless chain. To the chain is fixed a tiny pencil, which will be carried backwards and forwards between the wheels in a perpendicular line. This constitutes the register worked by the thermometer. The clockwork portion of the machine is so arranged that it causes a vertical cylinder, four inches diameter and five inches in length, to revolve once in twenty-four hours. Round this cylinder is fixed a piece of paper twelve inches long, five inches wide.

On the paper in the direction of its greatest length are ruled 100 lines, $\frac{1}{20}$ inch apart, each indicating 1° Fahrenheit. Across the paper, at right angles to these lines, are ruled twenty-four lines in dark ink, indicating the hours; between these three others, more lightly marked, for the quarters. The cylinder is so placed that as it revolves the surface of the paper is $\frac{1}{10}$ of an inch away from the point of the pencil register moving at right angles to its surface. A small striker is connected with the clockwork in such a manner that every five minutes (or oftener if required) it gives the pencil a gentle tap, thus striking its point against the paper. By this means all friction of the moving pencil against the paper is avoided, and the index is marked by a series of dots.

"Some particulars of the Transit of Venus across the Sun, 1874, Dec. 9, observed on the Himalaya Mountains, Mussoorie, at Mary Villa."—Note II., with appendix, by J. B. N. Hennessey, F.R.A.S.

Linnean Society, May 6.—Dr. G. J. Allman, F.R.S., president, in the chair.—The following papers were read:—On the anatomy of two parasitic forms of *Tetrarhynchidæ*, by Mr. F. H. Welch.—Notes on the Lepidoptera of the family *Zygænidæ*, with descriptions of new genera and species, by Mr. A. G. Butler, F.L.S. The main object of the paper was to rescue this section of Lepidoptera from the confusion into which it had been brought by the creation of new species and genera on insufficient grounds, by Mr. J. Walker. Some very curious instances of mimetism were mentioned between parallel series of species of hornet-moths and of Hymenoptera.—On the characteristic colouring matters of the red groups of Algæ, by Mr. H. C. Sorby, F.R.S. In this paper the author gave an account of some of the leading characters of the various remarkable blue, purple, and red substances soluble in water characteristic of red Algæ. The compound nature of the solutions obtained from the plants may be proved by the varying decomposing action of heat on the different colouring matters. He also showed that though *Oscillatoriæ* and *Rhodosporeæ* yield closely-related colouring substances, the specific differences serve to separate these two groups of Algæ quite as much as their general structure. Connecting links do indeed occur, and the further study of this question will probably yield interesting results. Specimens illustrating these facts were exhibited. A discussion followed, in which the President, Prof. Dyer, Mr. A. W. Bennett, and others took part.

Chemical Society, May 6.—Dr. Odling, F.R.S., vice-president, in the chair.—Prof. N. S. Maskelyne read a paper on Andrewsite and Chalcosiderite, the former of which is a new mineral from Cornwall named after Prof. Andrews. There were also papers entitled "An examination of methods for effecting the quantitative separation of iron, sesquioxide, alumina, and phosphoric acid," by Dr. W. Flight; and "On sodium ethylthiosulphate," by Mr. W. Ramsay.—Mr. J. Williams, in his communication "On a milligrade thermometric scale," proposes to substitute the freezing and boiling points of mercury for those of water, and to divide the scale into a thousand parts.—Mr. C. Griffin exhibited and described some new gas furnaces which are very economical and of great power.

Zoological Society, May 4.—Mr. E. W. H. Holdsworth in the chair.—Mr. Sclater exhibited and made remarks on a skin of a chick of a Cassowary (*Casuarius picticollis*), received from Dr. George Bennett, of Sydney, New South Wales. The bird had been obtained alive from the natives in Milne Bay, New Guinea, by Mr. Godfrey Goodman, Staff Surgeon, R.N., when in the *Basilisk* in 1873.—Prof. Newton exhibited and made remarks on a series of tracings of some hitherto unpublished drawings discovered in the Library of Utrecht, representing the Dodo and other extinct birds of Mauritius. Prof. Newton also exhibited and made remarks on two specimens of Ross's Arctic Gull, *Rhodostethia rossi*, one of the rarest of Arctic birds.—Mr. H. C. Sorby, F.R.S., read a paper on the colouring matter of the shells of birds-eggs as studied by the spectrum method, in which he showed that all their different tints are due to a variable mixture of seven well-marked colouring matters. Hitherto the greater part of these had not been found elsewhere. The principal red colouring-matter was connected with the hamoglobin of blood, and the two blue colouring matters were probably related to bile pigments; but in both cases it was only a chemical and physical relationship, and the individual substances were quite distinct, and it seemed as though they were special secretions. There appeared to be no simple connection between the production of these various egg-pigments and the general organisation of the birds, unless it were in the case of the Tinamous, in the shells of the eggs of many species of which occurs an orange-red substance not met with in any other eggs, unless it were in those of some species of Cassowary.—Mr. A. H. Garrod read a note on the hyoid bone of the Elephant, as observed in two specimens of the Indian Elephant which he had lately dissected, and showed that the position of the bone *in situ* had been mis-stated by former authorities.—A second paper by Mr. Garrod contained remarks on the relationship of two pigeons, *Ianthœnas leucolæma* and *Erythrœnas pulcherrima*, which he lately had an opportunity of examining.—A communication was read from Mr. G. E. Dobson on the bats belonging to the genus *Scotophilue*, in which he gave the description of a new genus and species allied thereto. The specimen in question had been obtained in the Bellary Hills, India, by the Hon. J. Dormer, by whom it had been presented to the British Museum. It was proposed to name it *Scotozous dormeri*.—A communication was read from Lieut. W. Vincent Legge, R.A., giving particulars of the breeding of certain Grallatores and Natatores on the south-eastern coast of Ceylon, together with notes on the nestling plumages of the same.

Geological Society, April 28.—Mr. John Evans, V.P.R.S., president, in the chair.—The following communications were read:—"On *Stagonolepis Robertsoni*, and on the evolution of the Crocodilia," by Prof. T. H. Huxley, Sec. R.S. After referring to his paper read before the Society in 1858, the author stated that he had since obtained, through the Rev. Dr. Gordon of Birnie, and Mr. Grant of Lossiemouth, further materials, which served at once to confirm the opinion then expressed by him, and to complete our knowledge of *Stagonolepis*. The remains hitherto procured consist of the dermal scutes, vertebræ of the cervical, thoracic, lumbar, sacral and caudal regions, ribs, part of the skull and the teeth, the scapula, coracoid and interclavicle, the humerus, and probably the radius, the ilium, ischium and pubis, the femur, and probably the tibia, and two metacarpal or metatarsal bones. The remains procured confirm the determinations given by the author in his former paper, except that the mandible with long curved teeth therein, superstitiously referred to *Stagonolepis*, proves not to belong to that animal. From the extant evidence it appears that in outward form *Stagonolepis* resembled one of the existing Caimans of intertropical America, except that it possessed a long narrow skull, like that of a Gavial. The dermal scutes formed a dorsal and ventral armour, but the dorsal shield did not contain more than two, nor the ventral shield more than eight longitudinal series of scutes. The posterior nares were situated far forward, as in lizards, neither the palatine nor the pterygoid bones uniting to prolong the nasal passage backwards, and give rise to secondary posterior nares, as in existing crocodiles. The teeth referred to *Stagonolepis* have short, swollen, obtusely pointed crowns, like the back teeth of some existing crocodiles; they sometimes present signs of wear. The scapula resembles that of recent crocodiles; the coracoid is short and rounded like that of the Ornithoscelida and of some lizards, such as *Hatteria*. The humerus is more Lacertian than in existing crocodiles. The acetabular end of the ischium resembles that of a lizard, and the rest of the bone is shorter dorso-ventrally and longer antero-posteriorly than in living crocodiles, thus resembling that of *Belodon*. The latter reptile, from the Upper Keuper of Würtemberg, is the nearest ally of *Stagonolepis*; both are members of the same natural group, and this must be referred to the order Crocodilia, which was described as differing from other Reptilia as follows:—The transverse processes of most cervical and thoracic vertebræ are divided into more or less distinct capitular and tubercular portions, and the proximal ends of the corresponding ribs are correspondingly divided; the dorsal ends of the subvertebral caudal bones are not united; the quadrate bone is fixed to the side of the skull; the pterygoids send forward median processes which separate the palatines and reach the vomer; there is an interclavicle, but no clavicles; the ventral edge of the acetabular portion of the ilium is entire or but slightly excavated; the ischia are not much prolonged backwards, and the pubes are directed forwards and inwards; the femur has no inner trochanter, and the astragalus is not a depressed concavo-convex bone with an ascending process. There are at least two longitudinal rows of dorsal dermal scutes. The Crocodilia are divided by the author into three sub-orders:—

1. Parasuchia, with no bony plates of the pterygoid or palatine bones to prolong the nasal passages; the Eustachian pas-

sages enclosed by bone; the centra of the vertebræ amphicœlian; the coracoid short and rounded; the ala of the ilium high, and its acetabular margin entire; and the ischium short dorso-ventrally and elongated longitudinally, with its acetabular portion resembling that of a lizard. Genera: *Stagonolepis, Belodon.*

2. Mesosuchia, with bony plates of the palatine bones prolonging the nasal passages, and giving rise to secondary posterior nares; a middle Eustachian canal included between the basioccipital and basisphenoid, and the lateral canals represented only by grooves; vertebral centra amphicœlian; coracoid elongated; ala of the ilium lower than in the preceding, higher than in the next sub-order, its acetabular margin nearly straight; ischium more elongated dorso-ventrally than in the preceding group, with its acetabular margin deeply notched. Genera: *Steneosaurus, Pelagosaurus, Teleosaurus, Teleidosaurus, Metriorhyncus* (*Goniopholis* ?, *Pholidosaurus* ?).

3. Eusuchia, with both pterygoid and palatine bones giving off plates which prolong the nasal passages; vertebral centra mostly procœlous; coracoid elongated; ala of the ilium very low in front, its acetabular margin deeply notched; ischium elongated dorso-ventrally, with its articular margin deeply excavated. Genera: *Thoracosaurus, Holops,* and recent forms.

The Mesosuchia are intermediate in character between the other two groups; the Parasuchia, where they differ from the Mesosuchia, approach the Ornithoscelida and Lacertilia, especially such as *Hatteria* and *Hyperodapedon*, with amphicœlous vertebral centra. The Eusuchia, on the other hand, are the Crocodilia which depart most widely from the Ornithoscelida and Lacertilia, and are the most Crocodilian of crocodiles. After indicating at some length the succession of modifications in the above three groups, the author remarked that if there is any solid ground for the doctrine of evolution, the Eusuchia ought to be developed from the Mesosuchia, and these from the Parasuchia, and showed that geological evidence proved that the three groups made their appearance in order of time, in accordance with this view. Thus, in the Trias there are the genera *Belodon* and *Stagonolepis* of the sub-order Parasuchia. In the Upper Lias we have *Steneosaurus* (*Mystriosaurus*) and *Pelagosaurus*, the first represented also in all Mesozoic formations up to the Kimmeridge Clay; in the Fuller's Earth *Teleosaurus* and *Teleidosaurus* occur; in the Kelloway Rock *Metriorhynchus*, also met with in the Oxford Clay and Kimmeridge Clay; in the Wealden, *Goniopholis, Macrorhynchus, Pholidosaurus*, and unnamed Teleosaurians; and in the Upper Chalk, *Hyposaurus*; all belonging to the Mesosuchia. In the Upper Chalk, again, the Eusuchia make their appearance, represented by the genera *Thoracosaurus, Holops*, and *Gavialis* (?). How far back the Parasuchia extend in time is not known, but they are not found in any formation subsequent to the Upper Trias. The author described a fragment of a skull of a Wealden crocodile, in which the posterior nares are smaller and situated further back than in *Metriorhynchus* or *Steneosaurus*. Of the nearest allies of the Crocodilia, the Lacertilia and Ornithoscelida, the former may be traced back from the present day to the Permian epoch, and the latter from the later Cretaceous to the Triassic epoch. The author discussed the question whether these types exhibit any evidence of a similar form of evolution to that of the Crocodilia. The cranial structure of the Permian Lacertilia is almost unknown, and the only important deviation from the type of the existing Lacertilia in the skeleton is that their vertebræ are amphicœlous, not procœlous. With this exception there is no evidence that the Lacertilian type of structure has undergone any important change from later Palæozoic times to the present day; and this change seems to have occurred earlier in the Lacertilia than in the crocodiles, as a sacral vertebra of a lizard from the Purbecks has the centrum concave in front and convex behind. With regard to the Ornithoscelida, the author noticed that the researches of American palæontologists proved the existence of those reptiles in abundance in quite the latter part of the Cretaceous epoch. He had himself indicated the existence of varied forms of Dinosauria in the Trias. He confirmed his former opinion that *Zanclodon* from the Upper Keuper of Würtemberg is a Dinosaur, and probably identical with *Teratosaurus* (von Meyer), in which case its affinity to *Megalosaurus* is exceedingly close. He corrected a statement in a former paper with regard to the ilium of the Thecodontosaurians, which he had turned the wrong way, and stated that when regarded in its proper position this ilium is much more Lacertilian than that of *Megalosaurus*. From this and other evidence of detail he inferred that the Triassic Thecodontosauria were devoid of some of the most marked peculiarities of the later Ornithoscelida, while the most ornithic of the latter belong to the second half of the Mesozoic period. The oldest crocodiles differ less than the recent ones from the Lacertilia, and the oldest Ornithoscelida also approach a less differentiated Lacertilian form, the two groups seeming to converge towards the common form of a lizard with Crocodilian vertebræ. *Cetiosaurus* is also a reptile with a vertebral system like that of the Thecodontosauria and Crocodilia, but with more Lacertilian limbs, and *Stenopelyx* may be in the same case. It may therefore be convenient hereafter to separate the Thecodontosauria, *Cetiosaurus* and perhaps *Stenopelyx* as a group, "Suchospondylia," distinct from both the Ornithoscelida and the Crocodilia (or "Sauroscelida").

"On the remains of a fossil forest in the Coal-measures at Wadsley, near Sheffield," by H. C. Sorby, F.R.S., Pres. R.M.S. In this paper the author described the occurrence of a number of stumps of *Sigillariæ* in position and with Stigmarian roots attached to them in the Coal-measure Sandstone in the grounds of the South Yorkshire Lunatic Asylum.—"On *Favistella stellata* and *Favistella calicina*, with notes on the affinities of *Favistella* and allied genera," by Mr. H. Alleyne Nicholson, F.R.S.E.

Mr. A. Tylor brought an apparatus for determining the heat evolved by the friction of ice upon ice, with a view to explain an important element in glacier motion. The apparatus, consisting of plates of ice eight inches square, placed in a wooden chuck three inches deep, was enclosed in a double sheet-iron case containing ice and salt, and kept at 32° F. One block of ice was rotated, and the other pressed against it. Four pounds of ice were reduced to water at the rate of 1¼ lb. in an hour, in consequence of the motion, that is by the heat evolved by friction of ice upon ice, the pressure being 2 lbs. on the square inch. Ice evaporates at 32°, and the same quantity of ice was reduced, when still, at about the rate of ¼ lb. in an hour at 32° F. Air at a higher temperature found its way into the case, and promoted melting. When this experiment was tried in a room at 54° F. with the same apparatus without any outer case, the friction of the ice in motion, at the above pressure, increased the production of water 3¼ times above the rate observed when the ice was still and exposed to a temperature of 54° F. The amount of heat evolved was nearly as much as in oak moving upon oak well lubricated, and the coefficient of friction was between 0·1 and 0·2. Glacier motion is impossible without a continual supply of water to lubricate the bottom. No doubt the action of denudation by glaciers produces heat to a small extent. The water obtained by melting the surface of the glacier by the sun's heat in the glacial period could not be sufficient alone. The position of deep lakes in all parts of the world in immediate connection with mountains, and never in places away from mountains, shows that lakes are integral parts of mountains; and, in fact, lakes are deepest exactly where the glaciers, once covering the mountains, were in a position to act as lake excavators. There can be no doubt that all deep lakes in the world, including those in Central Africa, below the Equator, are purely of glacial origin, and that the cold in the glacial period was nearly equally intense in the southern and northern hemispheres. The surface-ice would move much faster than the bottom ice, and the side-ice than the surface-ice, and therefore fractures would be continually occurring through all parts. The water produced by this great friction of ice upon ice would fall through the fissures to the bottom. He had pointed out that a glacier moved twice as fast when it was eight times as thick, and the influence of weight on motion must be considered a most important element. The present temperature of a thin glacier was found by Agassiz, from observation, to be one-third of a degree below freezing; but Mr. Tylor assumed that in such a lake-glacier as he had drawn, and supposed to exist in the glacial period, the temperature might be assumed to be very much below freezing, the greater cold arising from immense evaporation and other causes. He therefore concluded that the water produced by friction of ice upon ice falling to the bottom of the lake glacier through fissures would rapidly freeze, and thus expanding one tenth, would impel the glacier (shod or armed with blocks of stone and sand at the bottom) up a gradient of 1 in 20, excavating the Swiss and other lakes thirty or forty miles long, and 1,200 feet deep, in this manner. Mr. Tylor calculated that with half the work per annum of mean lake-excavation the lake of Zurich could be excavated in 15,000 years. Prof. Ramsay had pointed out, from geological evidence, that such lakes have been excavated by ice, but he did not indicate how this was mechanically possible (see *Quarterly Journal*, 1862). Mr. Tylor referred again to his experiment when the pressure was only 2 lbs. on the inch. In a large glacier

such as that described by Dr. Hooker in the Himalayan range, where the mean gradient of the surface was 40° to 50° and the actual fall was 14,000 feet in five or six miles, Dr. Hooker found great lakes attendant upon the mountains. Supposing the ice was a mile thick, the pressure would be half a ton on the inch, in the Himalayas at least, and the production of water by friction of ice upon ice enormous. Friction is dependent upon pressure and distance moved, and independent of velocity of motion.

Anthropological Institute, April 27.—Col. A. Lane-Fox, president, in the chair.—Mr. Francis Galton, F.R.S., contributed a note on the height and weight of boys aged fourteen, in town and country schools. The principal results showed the comparative heights and weights of those boys who were fourteen on their last birthday, in two groups of public schools, the one group of country schools and the other of town schools. It appeared that boys of fourteen in the country group were about $1\frac{1}{4}$ inches taller and 7 lbs. heavier than those in the town group, and that the difference of height was due in about equal degrees to retardation and to total suppression of growth; and that the distribution of heights in both cases conformed well to the results of the "Law of Error."—Rev. Joseph Mullens, D.D., read a paper on the origin and progress of the people of Madagascar. The Malagasy appeared to be a single race. No tribe is to be found secluded in any corner or in the hill districts different from the people of the plains or open provinces such as is met with in India, in Sumatra, and in Borneo; nor is any portion of the people specially degraded. The Malagasy are divided into three tribes—the Betsimisarakas, the Sacalavas, and the Hovas, the latter largely predominating in numbers and influence. With regard to the origin of the people, the author rejected the theory of Crawfurd and others, who argued for their African descent. Their language and tribal customs suggested a very different origin. There could hardly be any doubt that the Malay entered largely into the composition of the grammar and vocabulary, and continued researches into the Malay and Malagasy languages gave more and more evidence of their resemblances. The conclusion was that the Malagasy are a Malay people, following Malay customs, some of them possessing Malay eyes, hair, and features, and speaking a Malay tongue at the present time. They were an intelligent people, orderly, were well governed, and were daily improving, and the author of the paper could see the promise of a great and useful future for them.—Mr. J. J. Monteiro read a paper on the Quissama tribe of Angola, which he had written with the object of correcting some erroneous statements concerning them that had been formerly brought before the Institute.

CAMBRIDGE

Philosophical Society, March 8.—The following communications were made by Mr. W. T. Kingsley:—(1) On the cause of the "wolf" in the violoncello; (2) A description of the instruments used in sounding some of the lakes in the Snowdon district, and an account of the results obtained. Mr. Kingsley said that the "wolf" occurs somewhere about the low E or E flat, and was attributed to the finger-board having the same pitch, so that the finger-board becomes as it were a portion of the string stopped down on it and vibrates with it: if this is the true cause, the "wolf" cannot be got rid of, but may be placed at such a pitch between E and E flat as to occur on a note rarely used; also by thickening the neck of the finger-board, the extent of discursion in the vibration may be made less.—The Master of St. Catharine's College remarked that a different explanation of the phenomenon was given by M. Savart, which was to this effect. The old Italian makers constructed the violoncello of such dimensions that the mass of air included within the instrument resonates to a note making 85·33 vibrations in a second, a number which then represented the lowest F on the C string, but which now, owing to the rise of pitch since the beginning of the eighteenth century, nearly represents the note E immediately below it. Savart's theory was that notes half a tone above or below this E will cause beats between the vibrations of the string and those of the mass of included air. It seemed quite possible that the mass of air contained in the instrument should be capable of controlling the vibrations of the whole instrument, but not that the vibrations of the finger-board alone (as Mr. Kingsley suggested) could do this. For the sound, technically called the "wolf," is an actual check to the whole vibration of the violoncello, producing not merely beats, but a baying sound, destitute of the freedom of vibration which characterises other notes. But a great objection to the above explanation is this experiment. On an Italian instrument, the upper D on the fourth or lowest string is the imperfect note. But when the same note is elicited from the third string, the note is perfectly resonant. This peculiar effect seems then to depend upon the point of the finger-board which is pressed. It is also well known that the "wolf" can be modified by an alteration of the position of the sound-post. As an explanation, we may conceive that the whole framework of the violoncello vibrates like a stretched string, producing its fundamental, with a series of overtones, and that a nodal line passes through the point of the finger-board, pressure upon which produces the "wolf," and that thus, all vibrations being destroyed except those which have a node at the point of pressure, this peculiar tone is elicited.—Mr. Kingsley then gave a description of the plummet, registering apparatus, and protractors used by him in sounding several of the deep lakes in the Snowdon district last June. The plummet is a modification of the deep-sea plummet now generally used, the principal alteration being in the application of a heavy gouge to aid in bringing up specimens of the bottom. The recording apparatus is a modification of the paying-out apparatus used for laying deep-sea telegraph cables. The protractors are diagonal telescopes mounted on bars revolving on vertical axes, and having fiducial edges radiating from the centres of the axes. One protractor is placed at each extremity of the base on a horizontal table, on which is strained a sheet of drawing paper; the telescopes are first collimated with each other, and then a line is drawn by the fiducial edges on each sheet of paper; the boat with the sounding apparatus is followed by the two observers at the protractors, and when a signal is given, a line is ruled and numbered by each observer; finally, the two papers are placed so as to have the lines of collimation in coincidence and the centres at the scale distances apart; then by looking through the papers and pricking the intersections of the corresponding lines, the positions of the boat are laid down on two maps. In practice this is all done easily, and no particular skill is needed in the observers with the protractors. The results obtained showed that the bottoms of these lakes are comparatively flat, the greatest depths being reached at a short distance from the shore on the cross section, and occurring also nearer to the upper end of the lake than to the lower: the forms of the bottoms correspond in a remarkable manner with the set that would be given to glaciers descending into the hollows in which the lakes lie; and Mr. Kingsley believed them to have been formed by the action of glaciers during the extreme cold or penultimate glacier epoch; because in one case, that of Llyn Cawlyd, the lake lies almost on a watershed, where no glacier could now form, but which was a depression forming a lateral outflow from the great glacier that at one time filled the whole hollow between the Glydyns and Carnedds; during the last glacier epoch most of these hollows were again filled with ice to a great height, but these last glaciers were comparatively small. Mr. Kingsley especially dwelt upon the difficulty of disentangling the scattered moraine from the drift, and also of distinguishing between the striations belonging to the two cold epochs.

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